

CLAIMS

What is claimed:

1. A contact for a semiconductor device component, comprising:
a core comprising a polymer and configured to protrude from the semiconductor device component; and
a conductive coating on at least a portion of the core.
2. The contact of claim 1, wherein the core is flexible and resilient.
3. The contact of claim 1, wherein the core is substantially rigid.
4. The contact of claim 1, wherein the core comprises a plurality of at least partially superimposed, contiguous, mutually adhered layers of the polymer.
5. The contact of claim 1, wherein the polymer comprises a photoimagable polymer.
6. The contact of claim 1, wherein the core includes a base, an intermediate section, and a contact tip.
7. The contact of claim 6, wherein the intermediate section is flexible and resilient.
8. The contact of claim 6, wherein the base is configured to be secured to the semiconductor device component.
9. The contact of claim 6, wherein the conductive coating covers at least a portion of the contact tip and at least a portion of the intermediate section.
10. The contact of claim 9, wherein the conductive coating substantially covers the contact tip.

11. The contact of claim 9, wherein the contact tip is configured to electrically communicate with another contact of another semiconductor device component.
12. The contact of claim 9, wherein the conductive coating also covers at least a portion of the base.
13. The contact of claim 12, wherein a portion of the conductive coating on the base is configured to electrically communicate with a corresponding conductive element of the semiconductor device component.
14. The contact of claim 9, wherein the portion of the conductive coating on the intermediate section is configured to electrically communicate with a corresponding conductive element of the semiconductor device component.
15. The contact of claim 6, wherein the contact tip is enlarged relative to the intermediate section.
16. The contact of claim 1, wherein the conductive coating substantially covers the core.
17. The contact of claim 1, wherein the conductive coating comprises a plurality of layers of conductive material.
18. A method for forming a contact for a semiconductor device component, comprising:
stereolithographically fabricating a core of the contact; and
coating at least a portion of the core with at least one layer comprising conductive material.

19. The method of claim 18, wherein the stereolithographically fabricating comprises: forming at least one layer comprising unconsolidated material; and at least partially consolidating selected regions of the at least one layer.

20. The method of claim 19, wherein forming the at least one layer comprises forming at least one layer comprising an uncured photoimagable polymer.

21. The method of claim 19, wherein at least partially consolidating comprises exposing the selected regions to energy.

22. The method of claim 21, wherein exposing comprises directing an energy beam onto the selected regions.

23. The method of claim 22, wherein directing comprises directing a laser beam onto the selected regions.

24. The method of claim 19, further comprising: repeating forming the at least one layer and the at least partially consolidating at least once.

25. The method of claim 18, wherein stereolithographically fabricating comprises stereolithographically fabricating the core to include at least a portion which is flexible and resilient.

26. The method of claim 18, wherein stereolithographically fabricating comprises stereolithographically fabricating the core to include an enlarged contact tip.

27. The method of claim 18, wherein coating comprises substantially coating the core with the conductive material.

28. The method of claim 18, wherein coating comprises forming a seed layer on at least the portion of the core.

29. The method of claim 28, wherein forming the seed layer comprises at least one of chemical vapor deposition and physical vapor deposition.

30. The method of claim 28, wherein coating further comprises forming at least one additional layer comprising conductive material over the seed layer.

31. The method of claim 30, wherein forming the at least one additional layer comprises at least one of chemical vapor deposition, physical vapor deposition, electrolytic plating, electroless plating, and immersion plating.

32. The method of claim 30, wherein forming the at least one additional layer comprises:
forming a conductive layer; and
forming an oxidation-resistant layer over the conductive layer.

33. The method of claim 32, wherein forming the at least one additional layer further comprises:
forming a barrier layer between the conductive layer and the oxidation-resistant layer.

34. A contact of a semiconductor device component, comprising a plurality of at least partially superimposed, contiguous, mutually adhered layers.

35. The contact of claim 34, wherein each layer of the plurality of at least partially superimposed, contiguous, mutually adhered layers comprises at least one of a conductive polymer and a conductor-filled polymer.

36. The contact of claim 34, wherein each layer of the plurality of at least partially superimposed, contiguous, mutually adhered layers comprises a dielectric material.

37. The contact of claim 36, wherein the dielectric material comprises photopolymer.

38. The contact of claim 36, further comprising a conductive coating on at least an exterior surface of a core formed by the plurality of at least partially superimposed, contiguous, mutually adhered layers.

39. A method for forming a contact for a semiconductor device component, comprising stereolithographically fabricating at least one layer of the contact.

40. The method of claim 39, wherein the stereolithographically fabricating comprises stereolithographically fabricating the at least one layer from a dielectric material.

41. The method of claim 40, further comprising forming a conductive coating on at least a portion of an exterior surface of a core formed by the stereolithographically fabricating.

42. The method of claim 40, wherein the stereolithographically fabricating comprises stereolithographically fabricating the at least one layer from a conductive material.

43. The method of claim 42, wherein the stereolithographically fabricating comprises stereolithographically fabricating the at least one layer from at least one of a conductive polymer and a conductor-filled polymer.

44. A method for fabricating a probe card, comprising:
forming a sacrificial layer over a surface of a fabrication substrate;
forming at least one elongate contact over the sacrificial layer;
forming a support plate laterally around an intermediate section of the at least one elongate contact; and

removing the sacrificial layer to facilitate removal of the at least one contact from the fabrication substrate.

45. The method of claim 44, further comprising:
forming at least one recess within the fabrication substrate prior to the forming the sacrificial layer.

46. The method of claim 44, further comprising:
forming a layer comprising silicon nitride prior to the forming the sacrificial layer.

47. The method of claim 44, wherein forming the sacrificial layer comprises forming a layer comprising aluminum.

48. The method of claim 47, further comprising:
forming a plating mask over portions of the layer comprising aluminum where contacts are not to be formed.

49. The method of claim 48, further comprising:
plating regions of the layer comprising aluminum that are exposed through the plating mask.

50. The method of claim 44, wherein forming the at least one contact comprises stereolithographically fabricating at least a portion of the at least one contact.

51. The method of claim 44, wherein forming the at least one contact comprises forming the at least one contact with a wire-bonding capillary.

52. The method of claim 44, wherein forming the support plate comprises stereolithographically fabricating the support plate.

53. The method of claim 44, further comprising:
plating exposed portions of the at least one contact with conductive material.
54. A method for fabricating a probe card, comprising stereolithographically fabricating at least a portion of at least one of a support plate and a contact of the probe card.
55. The method of claim 54, wherein stereolithographically fabricating comprises stereolithographically fabricating at least a portion of the contact.
56. The method of claim 55, wherein stereolithographically fabricating at least a portion of the contact comprises stereolithographically fabricating a core of the contact.
57. The method of claim 55, wherein stereolithographically fabricating at least a portion of the contact comprises stereolithographically fabricating an outer shell of the contact.
58. The method of claim 54, wherein stereolithographically fabricating comprises stereolithographically fabricating at least a portion of the support plate.
59. The method of claim 58, wherein stereolithographically fabricating at least a portion of the support plate is effected around an intermediate portion of at least the contact.
60. A method for fabricating a probe card, comprising:
providing a substrate including at least one aperture extending therethrough;
stereolithographically fabricating an outer shell of a contact within the at least one aperture; and
introducing conductive material into a channel extending through the outer shell.
61. The method of claim 60, wherein stereolithographically fabricating includes forming the outer shell and the channel extending therethrough.

62. The method of claim 60, further comprising:
forming the channel through the outer shell following the stereolithographically fabricating.

63. The method of claim 60, wherein stereolithographically fabricating comprises:
forming a first section of the outer shell;
inverting the substrate; and
forming a second section of the outer shell.

64. The method of claim 60, wherein stereolithographically fabricating comprises
forming a first section of the outer shell around the elongate element comprising conductive
material.

65. The method of claim 64, further comprising:
aligning the at least one aperture of the substrate with elongate element and the first section; and
introducing at least a portion of the first section into the at least one aperture.

66. The method of claim 65, wherein stereolithographically fabricating further
comprises forming a second section of the outer shell around the elongate element following the
introducing.

67. The method of claim 64, further comprising:
forming the elongate element.

68. The method of claim 67, wherein forming is effected with a wire-bonding
capillary.

69. The method of claim 67, wherein forming comprises forming the elongate
element so as to protrude from a bonding joint and the substrate.

70. The method of claim 69, further comprising:
separating the elongate element from the substrate following stereolithographically fabricating.

71. The method of claim 70, wherein separating comprises at least one of cutting the elongate element and heating at least a joint between the elongate element and the substrate.

72. The method of claim 60, further comprising:
forming a conductive cap from the conductive material at at least one end of the contact.

73. The method of claim 60, further comprising:
forming an elongate conductive element that protrudes from at least one end of the contact.

74. A semiconductor device component, comprising:
a substrate;
at least one flexible, resilient contact protruding from at least one surface of the substrate; and
at least one protective structure positioned on the at least one surface so as to prevent
deformation of the at least one flexible, resilient contact beyond an elastic limit thereof.

75. The semiconductor device component of claim 74, wherein the substrate comprises at least one of a semiconductor device, an interposer, a carrier substrate, a test substrate, and a probe card.

76. The semiconductor device component of claim 74, wherein the at least one protective structure comprises a substantially planar member with at least one aperture formed therethrough, the at least one flexible, resilient contact being located within the at least one aperture and at least partially laterally surrounded by the substantially planar member.

77. The semiconductor device component of claim 74, wherein the at least one protective structure comprises an individual structure that surrounds at least a portion of each of the at least one flexible, resilient contact protruding from the at least one surface of the substrate.

78. The semiconductor device component of claim 77, wherein the at least one protective structure includes an aperture within which the at least one flexible, resilient contact is at least partially located.

79. The semiconductor device component of claim 74, wherein the at least one protective structure comprises a plurality of laterally discrete elements, each laterally discrete element of the plurality protruding from the at least one surface of the substrate laterally adjacent to a flexible, resilient contact.

80. The semiconductor device component of claim 74, wherein the at least one protective structure has a height that at least partially prevents the at least one flexible, resilient contact from being deformed beyond its elastic limit.

81. The semiconductor device component of claim 74, wherein the at least one protective structure is spaced apart from the at least one flexible, resilient contact a distance which at least partially prevents the at least one flexible, resilient contact from being deformed beyond its elastic limit.

82. The semiconductor device component of claim 74, wherein the at least one protective structure includes a plurality of at least partially superimposed, contiguous, mutually adhered layers.

83. A method for protecting flexible, resilient contacts that protrude from at least one of surface of a substrate, comprising disposing a protective structure on the at least one surface laterally adjacent to each flexible, resilient contact that protrudes from the at least one surface, the protective structure:
having a height which at least partially prevents an adjacent flexible, resilient contact from being deformed beyond its elastic limit; or

being spaced apart from the adjacent flexible, resilient contact a distance which at least partially prevents the adjacent flexible, resilient contact from being deformed beyond the elastic limit.

84. The method of claim 83, wherein disposing comprises forming the protective structure on the at least one surface.

85. The method of claim 83, wherein disposing comprises securing a preformed protective structure to the at least one surface.

86. The method of claim 83, further comprising forming the protective structure.

87. The method of claim 86, wherein forming comprises stereolithographically forming the protective structure.

88. The method of claim 87, wherein forming comprises:
forming at least one layer comprising substantially unconsolidated material; and
at least partially consolidating material in selected regions of the at least one layer.

89. The method of claim 88, further comprising:
repeating the forming and the at least partially consolidating at least once.

90. The method of claim 83, wherein disposing comprises disposing a substantially planar protective structure on the at least one surface, the substantially planar protective structure including a plurality of apertures therethrough, at least some contacts of the flexible, resilient contacts being at least partially disposed within corresponding apertures of the plurality of apertures and at least partially laterally surrounded by the substantially planar protective structure.

91. The method of claim 83, wherein disposing comprises disposing an individual protective structure around at least one flexible, resilient contact of the flexible resilient contacts, the individual protective structure including:
an aperture therethrough within which the at least one flexible, resilient contact is at least partially disposed; and
a side wall that at least partially laterally surrounds the at least one flexible, resilient contact.

92. The method of claim 83, wherein disposing comprises disposing at least one element adjacent to at least one flexible, resilient contact of the flexible, resilient contacts so as to protrude from the at least one surface.